

PATENT  
Attorney Docket No. 07040.0092-00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: )  
Luigi MIGLIARINI et al. ) Group Art Unit: 1714  
Application No.: 09/884,060 ) Examiner: Cain, E.  
Filed: June 20, 2001 )  
For: TIRE FOR VEHICLES HAVING A ) Confirmation No.: 2904  
HIGH WEAR RESISTANCE AND )  
VULCANIZABLE RUBBER )  
COMPOSITION FOR MAKING )  
THE SAME )

**Attention: Mail Stop Appeal Brief-Patents**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**AMENDED APPEAL BRIEF UNDER BOARD RULE § 41.37**

In response to the Notification of Non-Compliant Appeal Brief, dated August 10, 2006, and further to Board Rule 41.37(d), Appellants present this amended brief to correct the deficiencies in the original brief filed July 14, 2006, in response to the December 30, 2005, final rejection of claims 35-51, and 66-68.

This Amended Appeal Brief is timely filed with the one-month proscribed, since September 10, 2006 is a Sunday.

If any fees are required, Appellants request that the required fees be charged to Deposit Account No. 06-0916.

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**I. REAL PARTY IN INTEREST**

Pirelli Pneumatici S.P.A. is the real party in interest, as indicated by the assignment in its name, recorded at Reel 012245, Frame 0857.

**II. RELATED APPEALS AND INTERFERENCES**

There are currently no other appeals or interferences, of which Appellants, Appellants' legal representative, or assignee are aware, that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**III. STATUS OF CLAIMS**

Claims 35-51 and 66-68 are pending and have been finally rejected by the Examiner. Appellants appeal the rejection of those claims.

Further to 37 C.F.R. § 41.37(c)(1)(iii), the attached Appendix contains a clean copy of the claims.

**IV. STATUS OF AMENDMENTS**

All amendments have been entered. No amendments under 37 C.F.R. § 1.116 have been filed.



## V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to a tread comprising a vulcanizable rubber composition of the type comprising a cross-linkable unsaturated chain polymeric base and a sulfur-based vulcanizing system, and to a vehicle tire, for example, for cars and light trucks, wherein the tire has a high wear-resistance tread comprising the vulcanizable rubber composition. Specification-as-filed at page 1, lines 5-11.

In the field of vehicle tire manufacturing, one of the more difficult objectives to be reached has been to increase the wear resistance of the tire, while achieving at the same time a satisfactory skid resistance on wet roads. *Id.* at page 1, lines 20-23. The difficulties for achieving the aforementioned objective has become more complicated in recent times by the need to satisfy at the same time also a third parameter, namely, a reduced rolling resistance for which a strong demand presently exists in the tire market. *Id.* at page 1, lines 24-30. A compromise must be reached between all of the aforementioned parameters. *Id.* Typically, improvement of one parameters results in the worsening of other properties. *Id.* at page 2, lines 14-16 and 23-26.

In contrast, the Appellants have found a novel method of devising and providing a tread and tire that, while having an improved wear resistance, keeps substantially unaltered its characteristics of wet skid resistance and rolling resistance, and solves at least one of the aforementioned problems. *Id.* at page 2, line 28 to page 3, line 15. Specifically, Appellants surprisingly discovered tires, road-tested and compared with entirely equal tires but incorporating a tread according to the prior art, have achieved a clearly higher wear resistance, while keeping substantially unaltered the values of rolling

resistance and wet skid resistance, when the tread -- once vulcanized -- has i) a high amount of an extractable residue of at least one vulcanization accelerator containing at least one carbon atom bound to at least two sulfur atoms; ii) a reduced amount of activator; and iii) a reduced amount of combined sulfur. *Id.* at page 4, lines 9-29; see also examples at page 27, lines 11-20; page 28, lines 21-31; page 30, lines 1-10; and page 31, lines 10-16.

Accordingly, the present invention relates to a tread (claims 45-51) and a tire comprising a tread (claims 35-44), wherein the tread comprises a vulcanized polymeric base (specification-as-filed at page 3, lines 2-3, page 11, lines 29-33) including: at least one reinforcing filler dispersed in the polymeric base (*id.* at page 3, lines 4-5, page 12, lines 2-3); an amount of extractable residue of at least one vulcanization accelerator containing at least one carbon atom bound to at least two sulfur atoms, greater than or equal to 0.5% and less than or equal to 1.8% by weight based on the total weight of the tread (*id.* at page 3, lines 6-10, page 12, lines 4-8); an effective amount of at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread (*id.* at page 3, lines 11-13, page 9, lines 19-23, page 12, lines 9-11); and an amount of combined sulfur less than 2.5% by weight based on the total weight of the tread (*id.* at page 3, lines 14-15, page 9, lines 28-30, page 12, lines 12-13).

Further, the present invention relates to a process of manufacturing the tire comprising the tread (claim 66) (specification-as-filed at page 17, lines 16-21), a process of covering a worn tire with the tread (claim 67) (*id.* at page 17, lines 22-26),

and a method of increasing the wear resistance of a tire by inclusion of the tread (claim 68) (*id.* at page 17, line 27 to page 18, line 2).

The vulcanized (i.e., cross-linked) polymeric base may comprise at least one polymer. *Id.* at page 5, line 32 to page 6, line 2. Exemplary polymers are identified at page 6, lines 3-23 of the Specification. Exemplary reinforcing fillers are identified in the Specification at page 10, lines 5-15 and page 10, line 30 to page 11, line 11. Exemplary vulcanization accelerators are identified at page 7, line 6 to page 8, line 12 of the Specification.

Exemplary activators are identified at page 9, lines 6-18 of the Specification. The amount of activator, when expressed in terms of equivalents of zinc oxide, indicate the parts by weight of activator having an effectiveness substantially identical to one part by weight of zinc oxide with the vulcanization conditions being equal. Specification at page 3, lines 27-31.

“Combined sulfur” is understood to mean the sulfur that has actually contributed to the formation of the vulcanization network, *i.e.*, the sulfur that is present in the cross links formed between the various polymeric chains. *Id.* at page 3, line 32 to page 4, line 8.

**VI. GROUNDs OF REJECTION**

Claims 35-51 and 66-68 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,861,842 to Cohen *et al.* ("Cohen"). Review of this rejection is sought in this appeal.

## **VII. ARGUMENT**

Each claim of the present application is separately patentable, and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. § 282. The arguments set forth below are arranged under separate subheadings, and in accordance with 37 C.F.R. § 41.37(c)(1)(vii) these subheadings indicate the claims that are argued separately.

The Examiner maintains the rejections of claims 35-51 and 66-68 under 35 U.S.C. § 102(b) as being allegedly anticipated by U.S. Patent No. 4,861,842 to Cohen *et al.* (“Cohen”). See Office Action dated June 17, 2005, at 2. Specifically, the Examiner asserts that “the cure systems [of Cohen] are taught as comprising 0.5 to 2.0 phr sulfonamide accelerators, 1.0 to 5.0 phr of zinc oxide or zinc stearate and 0.75 to 3.0 phr sulfur-vulcanizing agents.” *Id.*

Appellants maintain that a case of anticipation under 35 U.S.C. § 102 has not been established for the reasons set forth below.

### **A. Independent Claims 35 and 45**

“A claim is anticipated only if **each and every element as set forth in the claim** is found . . . in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). Further, “[t]he identical invention must be shown in as complete detail as is contained in the . . . claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). See also M.P.E.P. § 2131. Additionally, a compound or composition of matter can only be anticipated if the disclosure of a single

reference places the compound or composition in the possession of the public. *See In re Brown*, 329 F.2d 1006, 1011, 141 USPQ 245, 249 (C.C.P.A. 1964). The reference must “clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without any need for picking, choosing, and combining various disclosures . . . .” *In re Arkley*, 455 F.2d 586, 587, 172 USPQ 524, 526 (C.C.P.A. 1972).

Cohen does not teach each and every element as set forth in the present claims. Among other things, Cohen does not teach “an effective amount of at least one activator, expressed as equivalents of zinc oxide, **less than or equal to 0.6% by weight based on the total weight of the tread.**” See claims 35 and 45. As the Examiner has acknowledged, Cohen teaches “1.0 to 5.0 phr of zinc oxide or zinc stearate.” Office Action at 2 (citing Cohen abstract). While Cohen does not disclose how much should be found in the tread, the Examiner continues to argue that “[t]hese amounts are seen as falling within applicants’ limitation when adjusted for the total weight of the tire tread.” *Id.*

**1. There is No Evidence that Cohen’s disclosure of “1.0 to 5.0 phr of zinc oxide or zinc stearate,” touches the presently claimed range.**

Appellants maintain that the Examiner’s argument is merely speculation regarding what a person of ordinary skill in the art could understand Cohen to teach. Accordingly, Appellants maintain that Cohen does not “clearly and unequivocally disclose the claimed compound or direct those skilled in the art to the compound without any need for picking, choosing, and combining various disclosures . . . .” *In re Arkley*, 455 F.2d at 587, 172 USPQ at 526 (C.C.P.A. 1972).

Appellants acknowledge that Cohen discloses a range of “1.0 to 5.0 phr of zinc oxide or zinc stearate;” however, that is insufficient to determine whether the claim limitation (0.6 weight percent) has been met, since values expressed in phr refer to the parts by weight of the specific ingredient based on 100 parts by weight of polymeric base. Specification as-published at paragraph [0078]. For example, Examples 1-8 of Cohen have either 3 or 4 phr zinc oxide, which means the zinc oxide is present in amounts near 1.5% (Examples 1-6) and near 2.2% (Examples 7 and 8), which are significantly greater than 0.6% by weight.<sup>1</sup>

In order to show anticipation of the claimed range, Appellants understand that the Examiner has asserted that if the minimum amount of 1.0 phr zinc oxide were used instead of the 3.0 phr of Examples 1-6, then a value of about 0.49% is determinable. The Examiner has not refuted Appellants’ understanding of the Examiner’s position as presented in the Response of October 13, 2005. Appellants submit the Examiner’s assertion is based on assumptions that defy the applicability of Section 102 analysis.

Cohen teaches that a person of ordinary skill must balance a significant multitude of components to achieve a desirable cure system. *See, e.g.*, col. 2, lines 43-68. Cohen acknowledges that the components, such as accelerators can yield particular problems. *Id.* at col. 1, lines 46-68. There is nothing in Cohen to suggest that all possible combinations of these components covering the full phr ranges will result in a cure system. More importantly, there is no evidence of a reasonable expectation that one can reduce the level of zinc oxide in the exemplary formulations to achieve a weight

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<sup>1</sup> Using Example 1 as a model. The weight percent zinc oxide is phr zinc oxide divided by sum of phr of remaining components = 3.0/ (50+50+64.5+31.5+1.0+1.25+3.0+1.0+0.35+0.60+1.8) = 3.0 / 205 = 1.46%.

percent less than or equal to 0.6% by weight. It is particularly notable that the zinc oxide level for the Examples of Cohen are in the preferred range of 2.0 to 4.0 phr, whereas 1.0 phr is never used.

**2. Cohen fails to teach presently claimed range with sufficient specificity.**

However, even if, **solely for the sake of argument**, Cohen's disclosure of "1.0 to 5.0 phr of zinc oxide or zinc stearate," touches the presently claimed range amount of "at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread," Cohen still does not anticipate the present claims, because it does not disclose the claimed range with sufficient specificity.

The M.P.E.P. provides direction as to how to determine whether a prior art reference adequately discloses a range in order to be deemed anticipatory of that range. According to M.P.E.P. § 2131.03(II):

[w]hen the prior art disclosed a range which touches, overlaps or is within the claimed range, but no specific examples falling within the claimed range are disclosed, a case by case determination must be made as to anticipation. In order to anticipate the claims, the claimed subject matter must be disclosed in the reference with 'sufficient specificity to constitute an anticipation under the statute.' . . . If the claims are directed towards a narrow range, the reference teaches a broad range, and there is evidence of unexpected results within the claimed narrow range . . . it may be reasonable to conclude that the narrow range is not disclosed with 'sufficient specificity.'

M.P.E.P. § 2131.03(II) (emphasis added). M.P.E.P. § 2131.03 is applicable since, as discussed above, none of the Examples has "at least one activator, expressed as

equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread," and Cohen teaches a very broad range for zinc oxide.

Appellants submit that, as demonstrated in the specification as filed, and reinforced by the comparative testing results in the Declaration under 37 C.F.R. § 1.132, submitted May 17, 2005, and enclosed for the Board's consideration, Cohen does not anticipate the present claims according to M.P.E.P. § 2131.03.

In the specification-as-filed, Appellants have shown that an unexpected increased resistance to wear is accompanied by substantially unaltered values of rolling resistance and wet-skid resistance for the claimed treads/tires. See Specification, at p. 4/II. 23-29, p. 27/II. 11-20, p. 28/II. 21-31, p. 30/II. 1-10, and Tables II, IV, and VI. Rubber compositions showing this increased resistance to wear include those where the reinforcing filler is 100% silica (*id.*, Table II), 50% silica and 50% carbon black (*id.*, Table IV), and 100% carbon black (*id.*, Table VI).

Appellants have also submitted additional experimental data, which is above and beyond the data contained in the specification, to reinforce the original teachings of the specification. As shown in Tables IA, IB, and IC, of the Declaration, three sets of Inventive and Comparative Compositions were compared, wherein both the Inventive and Comparative Compositions comprised the same ingredients in the same amounts, except for the amount of activator expressed as equivalents of zinc oxide. The difference between the three sets of compositions is the type of filler: 50% carbon black and 50% silica by weight of filler, 100% silica by weight of filler, and 100% carbon black by weight of filler. See Declaration under 37 C.F.R. § 1.132 at ¶7.

The inventive Compositions MMX06, MMX04, SIL06, SIL04, CB06, and CB04, possess all of the elements of independent claims 35 and 45, including at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread. *See Declaration under 37 C.F.R. § 1.132 at ¶9.* The Comparative Compositions MMX22, MMX15, MMX10, SIL22, SIL15, SIL10, CB22, CB15, CB10 possess all of the elements of independent claims 35 and 45, except that the amount of activator is in accordance with Examples 1-8 of Cohen. *See id.* at ¶8.

As admitted by the Examiner, “the declaration would appear to indicate improved wear resistance for zinc oxide levels of 0.6 and 0.4.” Office Action at 2; *see also*, Declaration under 37 C.F.R. § 1.132 at ¶ 14 and Table II. In fact, the evidence shows that **the wear resistance improves when the amount of zinc oxide is within the reduced claimed range** (as measured by the decrease in abraded volume from 22% to 15% to 10% to 6% to 4%). Declaration under 37 C.F.R. § 1.132 at ¶ 14 and Table II. A fact not recognized by Cohen. Appellants note that the Examiner has not asserted that there is evidence or reasoning to believe that these results are anything but unexpected. In fact, Appellants have identified no evidence that Cohen recognizes any advantage whatsoever to reduced levels of activator (whether expressed as equivalents of zinc oxide or otherwise).

This improved performance is seen, while maintaining wet skid resistance and rolling resistance (which are related to the values of  $\tan\delta$  at 0°C and 70°C, respectively). *See id.* A person of ordinary skill in the art, prior to Appellants’ discovery, would have expected wear resistance results comparable to the Comparative Compositions and would not expect improved wear resistance without compromising

either wet skid resistance and/or rolling resistance. *See id.* at ¶15. The Examiner has not challenged these conclusions.

Thus, Appellants reiterate their argument that one of ordinary skill in the art would not consider the disclosure of Cohen to be of “sufficient specificity” to constitute anticipation of the claims because: (1) Cohen teaches a broad increasing range of 1.0 to 5.0 phr of zinc oxide or zinc stearate; (2) Cohen teaches a preference for levels of zinc oxide greater than the claimed range (col. 4, lines 36-37), (3) the examples of Cohen do not teach a composition with zinc oxide within the claimed range; and (4) one skilled in the art would not expect the superiority of the claimed compositions with the claimed range of at least one activator from Cohen’s teachings. “An anticipating reference must describe the [claimed] subject matter with sufficient clarity and detail to establish that the subject matter existed and that its existence was **recognized by persons of ordinary skill in the field of the invention.**” *ATD Corp. v. Lydall Inc.*, 159 F.3d 534, 545, 48 USPQ2d 1321, 1328 (Fed. Cir. 1998) (emphasis added) (citations omitted). As demonstrated, the present invention could not have been and was not recognized in Cohen’s disclosure by persons of ordinary skill in the art. Accordingly, Cohen does not place the presently claimed composition in the possession of the public, and cannot be said to anticipate. *See In re Brown*, 329 F.2d at 1011, 141 USPQ at 249 (C.C.P.A. 1964).

In response to Appellants demonstration of unexpected results, the Examiner has contended that “these two data points alone are not sufficient to demonstrate unexpected results for the entirety of [Appellants’] claimed range.” *Id.* Appellants respectfully disagree.

First, the Examiner has applied the incorrect line of analysis. There is no requirement to demonstrate unexpected results for the “entirety of the range” under M.P.E.P. § 2131.03, unlike when experimental results are offered to rebut a *prima facie* showing of obviousness. Rather, M.P.E.P. § 2131.03 expressly recites that if “there is evidence of unexpected results **within the claimed narrow range** . . . it may be reasonable to conclude that the narrow range is not disclosed with ‘**sufficient specificity.**’” (emphasis added). M.P.E.P. § 2131.03. M.P.E.P. § 2131.03 expressly likens the analysis to whether a species is clearly envisaged from a generic teaching, citing M.P.E.P. § 2131.02.

Further, M.P.E.P. § 2131.03 directs one to M.P.E.P. § 2144.05, which has a separate line of analysis, when there is an issue of obviousness with respect to ranges. Here, if the Office were to assert the ranges were obvious, then the Office would need to show that Cohen recognizes the amount of activator as a result effective variable. M.P.E.P. § 2144.05(IIB). Appellants note that there is no evidence of such a recognition by Cohen.

Second, the evidence of record establishes that “there is evidence of unexpected results **within the claimed narrow range** . . . ,” which is all that is required. In view of this evidence, a person of ordinary skill in the art would not understand (or envisage) Cohen as disclosing the narrow, claimed range with its unexpected results with sufficient specificity. The Experimental Results submitted with the Declaration show unexpected results at 0.4% and 0.6% by weight of the tread, which bracket what Appellants understand to be the lowest alleged value of Cohen. Moreover, Appellants’ data clearly establish that when the amount of activator is within the reduced claimed

range, there is less abraded materials and, thus, better wear resistance." See Table II of Declaration. Accordingly, the data supports the fully claimed range, even though it is unnecessary to do so.

Yet nothing in Cohen suggests any appreciation of such unexpected results, such that a person of ordinary skill in the art would recognize that the claimed range is disclosed with sufficient specificity. In fact, Cohen directs a person of ordinary skill in the art away from the claimed ranges by teaching both a preference for greater values, *i.e.*, 2.0 to 4.0 phr (col. 4, lines 36-37) and Examples disclosing amounts near 1.5% and near 2.2% by weight of the tread (cols. 5-9).

Further, Appellants submit that a single point, 0.6% zinc oxide, which demonstrates unexpected results as compared to Cohen, should alone be enough to show that Cohen does not teach the claimed invention with sufficient specificity. Such zinc oxide levels and their effects on wear properties are not taught, disclosed or intimated at in Cohen.<sup>2</sup> Thus, the second data point only bolsters the unexpected

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<sup>2</sup> As Appellants have previously pointed out to the Examiner, the specification of the present invention discloses several unexpected results, including at least: (a) tires with increased resistance to wear; (b) limiting of problems related to the use of polybutadiene in the polymer base of a rubber composition of a tire; (c) improved tire performance in terms of tear resistance; and (d) improved tire performance in terms of resistance to the chunking phenomenon.

The increased resistance to wear is accompanied by substantially unaltered values of rolling resistance and wet-skid resistance. See Specification, at p. 4/II. 23-29, p. 27/II. 11-20, p. 28/II. 21-31, p. 30/II. 1-10, and Tables II, IV, and VI. Rubber compositions showing this increased resistance to wear include those where the reinforcing filler is 100% silica (*id.*, Table II), 50% silica and 50% carbon black (*id.*, Table IV), and 100% carbon black (*id.*, Table VI).

showing of the first data point, and both reinforce the teaching of the present specification: improved wear properties are inversely related to zinc oxide values. Nevertheless, Appellants submit that the evidence of record, showing a trend toward improved wear with lower levels of zinc oxide, negates the Examiner's perceived need for additional data.

Thus, for at least the foregoing reasons, the Section 102(b) rejection of Claims 35 and 45 over Cohen is improper and Appellants respectfully request its reversal.

**B. Dependent Claims 36-44, 46-51, and 66-68**

Appellants submit that dependent claims 36-44, 46-51, and 66-68 also are patentable under 35 U.S.C. § 102 over Cohen, at least due to the direct or indirect dependency of claims 36-44 from independent claim 35, and the direct or indirect dependency of claims 46-51 and 66-68 from independent claim 45.

Thus, for at least the foregoing reasons, the Section 102(b) rejection of the dependent claims over Cohen is improper and Appellants request its reversal.

**VIII. CONCLUSION**

For the reasons given above, pending claims 35-51 and 66-68 are allowable and reversal of the Examiner's rejection is respectfully requested. The Examiner has failed to establish anticipation under 35 U.S.C. § 102(b) at least because there is no evidence that Cohen's disclosure of "1.0 to 5.0 phr of zinc oxide or zinc stearate," touches the

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The performance of a tire of the invention can be optimized both in terms of tear resistance and resistance to the chunking phenomenon, particularly under severe-use conditions. (*Id.*, p. 5/II. 27-31).

presently claimed range, and moreover, Cohen does not teach the claimed range with sufficient specificity under M.P.E.P. § 2131.03(II).

To the extent any extension of time under 37 C.F.R. § 1.136 is required to obtain entry of this Amended Appeal Brief, such extension is hereby respectfully requested. If there are any fees due under 37 C.F.R. §§ 1.16 or 1.17 which are not enclosed herewith, including any fees required for an extension of time under 37 C.F.R. § 1.136, please charge such fees to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,  
GARRETT & DUNNER, L.L.P.

Dated: September 11, 2006

By: Anthony A. Hartmann  
Anthony A. Hartmann  
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**Claims Appendix to Appeal Brief Under Rule 41.37(c)(1)(viii)**

Claims 1-34 (Canceled)

Claim 35 (Previously Presented): A tire for a vehicle wheel, comprising a tread comprising a vulcanized polymeric base including:

at least one reinforcing filler dispersed in the polymeric base;

an amount of extractable residue of at least one vulcanization accelerator,

containing at least one carbon atom bound to at least two sulfur atoms, greater than or equal to 0.5% and less than or equal to 1.8% by weight based on a total weight of the tread;

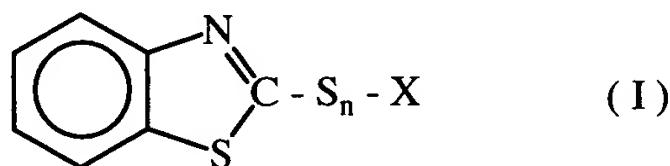
an effective amount of at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread; and

an amount of combined sulfur less than or equal to 2.5% by weight based on the total weight of the tread.

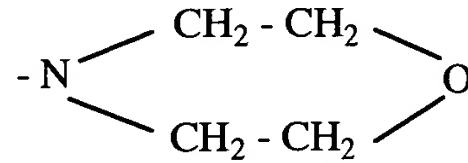
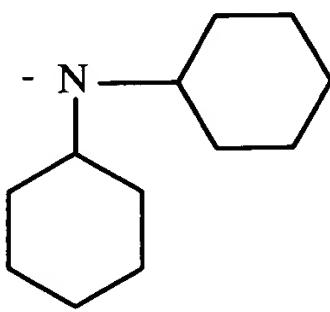
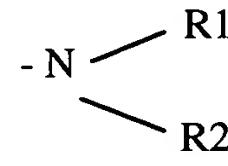
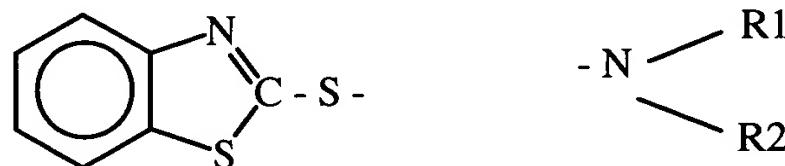
Claim 36 (Previously Presented): The tire of claim 35, wherein the polymeric base is obtained starting from at least one polymer selected from the group comprising: natural rubber; polybutadiene; polychloroprene; polyisoprene; optionally halogenated isoprene-isobutene copolymers; butadiene-acrylonitrile copolymers; copolymers obtainable by polymerization of at least one conjugated diene with at least one vinyl aromatic hydrocarbon; optionally halogenated isobutylene/p-methyl styrene copolymers; styrene-butadiene-isoprene terpolymers, obtained either in solution or in emulsion; ethylene-propylene-diene terpolymers; and mixtures thereof.

Claim 37 (Previously Presented): The tire of claim 35, wherein the at least one vulcanization accelerator is selected from accelerators including at least one 2-benzothiazole or sulphenamide group.

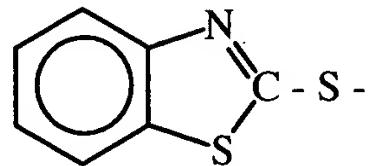
Claim 38 (Previously Presented): The tire of claim 37, wherein the at least one vulcanization accelerator has a following structural formula:



wherein n is an integer from 1 to 5 and X is H or a group selected from:



wherein R1 and R2 are independently H; an alkyl group; a saturated ring optionally comprising C, S, or O; a cycloalkyl group having 5 or 6 carbon atoms; or a group



**Claim 39 (Previously Presented):** The tire of claim 37, wherein the at least one vulcanization accelerator is selected from the group comprising: 2-mercaptobenzothiazole (MBT), dibenzothiazyl disulphide (MBTS), N-cyclohexyl-2-benzothiazyl-sulphenamide (CBS), N-tert.butyl-2-benzothiazyl sulphenamide (TBBS), 2-morpholinthia-2-benzothiazole (MBS), N-dicyclohexyl-2-benzothiazyl sulphenamide (DCBS), benzothiazyl-2-diisopropyl sulphenamide (DIBS), benzothiazyl-2-tert.amyl sulphenamide (AMZ), morpholine-thiocarbonyl sulphenmorpholine (OTOS), N-tert.butyl-2-benzothiazol sulphenamide (TBSI), and mixtures thereof.

**Claim 40 (Previously Presented):** The tire of claim 37, wherein a weight ratio of the amount of extractable residue of the at least one vulcanization accelerator to the amount of the at least one activator, expressed in terms of zinc oxide equivalents, is less than or equal to 10:1.

**Claim 41 (Previously Presented):** The tire of claim 35, wherein a weight ratio of the amount of combined sulfur to the amount of extractable residue of the at least one

vulcanization accelerator is greater than or equal to 1.2:1 and less than or equal to 2.8:1.

Claim 42 (Previously Presented): The tire of claim 35, wherein the at least one activator is selected from the group comprising: oxygenated compounds of a metal selected from Zn, Bi, or Pb; salts formed between the metal and a fatty acid, either saturated or unsaturated, having from 8 to 18 carbon atoms; and mixtures thereof.

Claim 43 (Previously Presented): The tire of claim 35, wherein the at least one reinforcing filler comprises carbon black, silica, or carbon black and silica.

Claim 44 (Previously Presented): The tire of claim 43, wherein the at least one reinforcing filler comprises greater than or equal to 0 phr and less than or equal to 100 phr of carbon black and greater than or equal to 0 phr and less than or equal to 100 phr of silica.

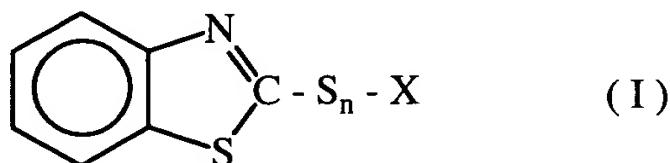
Claim 45 (Previously Presented): A tread for a vehicle tire, comprising a vulcanized polymeric base including:

- at least one reinforcing filler dispersed in the polymeric base;
- an amount of extractable residue of at least one vulcanization accelerator, containing at least one carbon atom bound to at least two sulfur atoms, greater than or equal to 0.5% and less than or equal to 1.8% by weight based on a total weight of the tread;

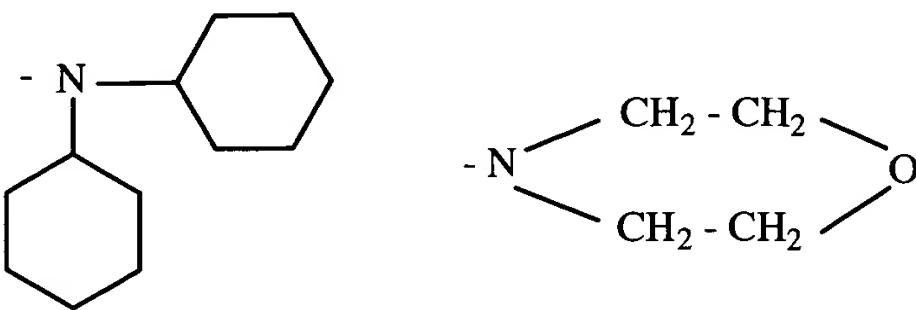
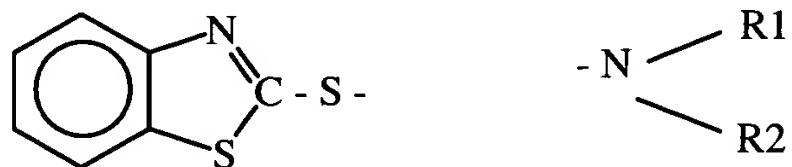
an effective amount of at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread; and  
an amount of combined sulfur less than or equal to 2.5% by weight based on the total weight of the tread.

**Claim 46 (Previously Presented):** The tread of claim 45, wherein the at least one vulcanization accelerator is selected from accelerators including at least one 2-benzothiazole or sulphenamide group.

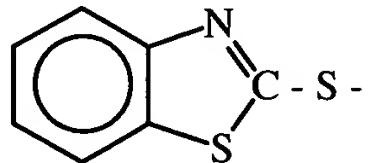
**Claim 47 (Previously Presented):** The tread of claim 46, wherein the at least one vulcanization accelerator has a following structural formula:



wherein n is an integer from 1 to 5 and X is H or a group selected from:



wherein R1 and R2 are independently H; an alkyl group; a saturated ring optionally comprising C, S, or O; a cycloalkyl group having 5 or 6 carbon atoms; or a group



**Claim 48 (Previously Presented):** The tread of claim 45, wherein a weight ratio of the amount of extractable residue of the at least one vulcanization accelerator to the amount of the at least one activator, expressed in terms of zinc oxide equivalents, is less than or equal to 10:1.

**Claim 49 (Previously Presented):** The tread of claim 45, wherein a weight ratio of the amount of combined sulfur to the amount of extractable residue of the at least one vulcanization accelerator is greater than or equal to 1.2:1 and less than or equal to 2.8:1.

**Claim 50 (Previously Presented):** The tread of claim 45, wherein the at least one activator is selected from the group comprising: oxygenated compounds of a metal selected from Zn, Bi, or Pb; salts formed between the metal and a fatty acid, either saturated or unsaturated, having from 8 to 18 carbon atoms; and mixtures thereof.

Claim 51 (Previously Presented): The tread of claim 45, wherein the at least one reinforcing filler comprises carbon black, silica, or carbon black and silica.

Claims 52-65 (Canceled).

Claim 66 (Previously Presented): A process for manufacturing a tire for vehicle wheels, comprising the steps of preparing, around a circumference of a belt structure, a tread of claim 45, and linking, by vulcanization, the tread to the belt structure.

Claim 67 (Previously Presented): A process for covering a worn tire for vehicle wheels, comprising the steps of preparing, around a circumference of a belt structure, a tread of claim 45, and irreversibly linking the tread to the belt structure.

Claim 68 (Previously Presented): A method for increasing wear resistance of a tire, the tire being provided with at least one carcass ply on which a belt structure is circumferentially applied, and with a tread circumferentially applied around the belt structure and externally provided with a rolling surface suitable to get in touch with the ground, wherein the tire is provided with a tread of claim 45.

**Evidence Appendix to Appeal Brief Under Rule 41.37(c)(1)(ix)**

Declaration under 37 C.F.R. § 1.132 of Fabio NEGRONI previously submitted on  
May 17, 2005

**Related Proceedings Appendix to Appeal Brief Under Rule 41.37(c)(1)(x)**

There are no related Appellate proceedings or decisions to be cited in this case.



**PATENT**  
Customer No. 22,852  
Application No.: 09/884,060  
Attorney Docket No. 07040.0092-00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

**Luigi MIGLIARINI et al.**

Application No.: 09/884,060

Filed: June 20, 2001

For: **TIRE FOR VEHICLES HAVING A HIGH  
WEAR RESISTANCE AND  
VULCANIZABLE RUBBER COMPOSITION  
FOR MAKING THE SAME**

) Group Art Unit: 1714

) Examiner: Cain, E.

) Confirmation No. 2904

**Mail Stop RCE**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**DECLARATION UNDER 37 C.F.R. § 1.132**

I, Fabio NEGRONI, declare and state that:

1. I am an Italian citizen, residing at Via Luigi Galvani 12, Galliate (No), Italy.
2. I have been awarded a degree in Chemistry from the University of Milano (Italy).
3. I have been employed by Pirelli Pneumatici, S.p.A. ("PIRELLI") since 1984 and I am presently employed as a Responsible for Chemical Testing in the Material Development department at PIRELLI. During my employment at PIRELLI, I have been engaged in the research and development of automotive tires.

4. I am one of the inventors of U.S. Patent Application No.: 09/884,060.  
5. Either I, or those under my direct supervision, performed the experiments described below.

6. Given my education and experience, particularly in the area of automotive tires and their compositions, I consider myself able to provide the following testimony based on experiments conducted by me or under my direct supervision.

## I. COMPARATIVE TESTING

### A. PREPARATION OF THE RUBBER COMPOSITIONS

7. Comparative testing was performed with fifteen rubber compositions, which were prepared according to the procedures given in Examples 1-2 of U.S. Patent Application No. 09/884,060. These compositions were divided into three groups based on the kind of reinforcing filler used:

- a first group including Inventive Compositions MMX06 and MMX04 and Comparative Compositions MMX22, MMX15, and MMX10; comprising 50% carbon black (CB) and 50% silica by weight, relative to the total weight of reinforcing filler;
- a second group including Inventive Compositions SIL06 and SIL04 and Comparative Compositions SIL22, SIL15, and SIL10; comprising 100% silica by weight, relative to the total weight of reinforcing filler;
- a third group including Inventive Compositions CB06 and CB04 and Comparative Compositions CB22, CB15, and CB10; comprising 100% carbon black (CB) by weight, relative to the total weight of reinforcing filler.

8. The Comparative Compositions were prepared in accordance with the procedures and ingredients types given in Examples 2, 4 and 8 of U.S. Patent

Application No. 09/884,060. The Comparative Compositions had the compositions shown in the following Tables IA, IB, and IC, respectively. When the Comparative Compositions were formed into respective tire treads, they were tire treads comprising a vulcanized polymeric base including:

at least one reinforcing filler dispersed in the polymeric base,  
an amount of extractable residue of at least one vulcanization accelerator,  
containing at least one carbon atom bound to at least two sulfur atoms, greater than or equal to 0.5% and less than or equal to 1.8% by weight based on a total weight of the tread;

an effective amount of activator in accordance with Examples 1-8 of U.S. Patent No. 4,861,842; and

an amount of combined sulfur less than or equal to 2.5% by weight based on the total weight of the tread.

9. The Inventive Compositions were prepared in accordance with the procedures and ingredients types given in Examples 2, 4 and 8 of U.S. Patent Application No. 09/884,060. The Inventive Compositions had the compositions shown in the following Tables IA, IB, and IC, respectively. When the Inventive Compositions were formed into respective tire treads, they were tire treads comprising a vulcanized polymeric base including:

at least one reinforcing filler dispersed in the polymeric base,  
an amount of extractable residue of at least one vulcanization accelerator,  
containing at least one carbon atom bound to at least two sulfur atoms, greater than or

equal to 0.5% and less than or equal to 1.8% by weight based on a total weight of the tread;

an effective amount of at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread; and

an amount of combined sulfur less than or equal to 2.5% by weight based on the total weight of the tread.

10. The amount of activator was determined by means of the analytical methods described in ISO 6001/1 standard for the determination of the activator in accordance with U.S. Patent Application No. 09/884,060.

**B. Test Measurements**

**1. DETERMINATION OF THE PROPERTIES OF THE RUBBER COMPOSITIONS**

11. According to procedures conventional *per se* and known in the art, the Inventive and Comparative Compositions were submitted to vulcanization and then to a number of tests in order to evaluate some characteristic parameters of the vulcanized compositions. Such parameters are considered as representative of the characteristics of a tire tread obtained with said compositions.

12. The parameters taken into consideration, which were also considered and described in U.S. Patent Application No. 09/884,060, were the following:

T90 = time at 170°C necessary to reach 90% of the final couple value measured by means of Monsanto rheometer model MDR 2000;

TS2 = time at 170°C necessary to achieve an increase of two rheometric units measured by means of Monsanto rheometer model MDR 2000;

CA 1 = traction force (referred to the section of the test piece), necessary to have a 100% strain, measured according to DIN 53504 standard;

CA 3 = traction force (referred to the section of the test piece), necessary to have a 300% strain, measured according to DIN 53504 standard;

IRHD = International Rubber Hardness Degree measured according to DIN 53519 standard, part 1;

R.E. = % elastic yield measured by torsion pendulum (pendulum Zerbinii), according to ISO 4662 standard;

abraded volume = amount of rubber composition removed operating in the standard conditions specified in DIN 53516 standard;

E' 0°C = elasticity modulus measured at 0°C;

E" 0°C = loss modulus measured at 0°C;

Tanδ 0°C = ratio between the loss modulus (E") and the elasticity modulus (E') measured at 0°C;

E' 70°C = elasticity modulus measured at 70°C;

E" 70°C = loss modulus measured at 70°C; and

Tanδ 70°C = ratio between the loss modulus (E") and the elasticity modulus (E') measured at 70°C.

13. The values of E', E" and Tanδ were determined by using commercially available apparatuses of the company INSTRON, and submitting a cylindrical test-piece made of vulcanized rubber composition, having a length of 25 mm and a diameter of 14 mm, precompressed up to a longitudinal deformation of 25% of its original height and kept at the prefixed temperature (0° or 70°C), to a dynamic sinusoidal deformation

having a maximum width of  $\pm 3.50\%$  of the height under preloading, with a frequency of 10 cycles per second (10 Hz). The results of the experimental tests carried out are shown in the following Table II.

**C. Discussion**

14. The greater the amount of abraded volume, the poorer the performance. The greater the  $\text{Tan}\delta$  at 0°C, the better the wet skid resistance. The greater the  $\text{Tan}\delta$  at 70°C, the poorer the rolling resistance performance. Accordingly, in the light of the experimental results reported in Table II, it is my opinion that all three sets of Inventive Compositions achieve, with respect to the three sets of Comparative Compositions, a marked improvement in terms of wear resistance (which is related to the amount of removed rubber composition), without diminishing performances in terms of wet skid resistance and rolling resistance (which are related to the values of  $\text{Tan}\delta$  at 0°C and 70°C respectively).

15. Prior to Applicants' discovery that an effective amount of at least one activator, expressed as equivalents of zinc oxide, less than or equal to 0.6% by weight based on the total weight of the tread yields improved performance, a person of ordinary skill in the art would have expected comparable wear resistance results between the Inventive Compositions, MMX06 and MMX04, SIL06 and SIL04, and CB06 and CB04, and the Comparative Compositions, MMX10, MMX15, and MMX22; SIL10, SIL15, and SIL22; and CB10, CB15, and CB22, respectively. Prior to Applicants' discovery, a person of ordinary skill in the art would NOT have expected to find the superior performance of the Inventive Compositions MMX06 and MMX04, SIL06 and SIL04, and CB06 and CB04 over the respective Comparative Compositions.

16. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated: 17/5/2005

By: Fabio Negroni  
Fabio NEGRONI

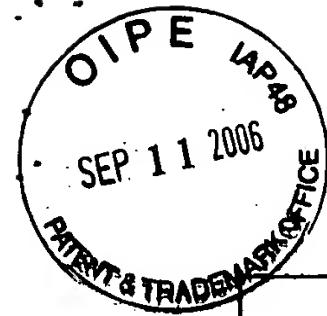


TABLE IA

Example 4 - 50/50% silica/CB	Comparative Compositions			Inventive Compositions	
	MMX10	MMX15	MMX22	MMX06	MMX04
S-SBR Buna VSL 5025 HM-1	50	50	50	50	50
BR Europrene Neocis	20	20	20	20	20
NR	30	30	30	30	30
CB (N375)	30	30	30	30	30
Zeosil 1165 MP	30	30	30	30	30
TESPT	4,8	4,8	4,8	4,8	4,8
aromatic oil	10	10	10	10	10
wax	1	1	1	1	1
stearic acid	2	2	2	2	2
ZnO	1,86	2,81	4,16	1,11	0,74
6PPD	2,5	2,5	2,5	2,5	2,5
MBTS 80	3,75	3,75	3,75	3,75	3,75
sulfur	1	1	1	1	1
amount of ZnO, expressed as equivalents of zinc oxide, based on the total weight of the tread (%)	1,00	1,50	2,20	0,60	0,40

TABLE IB

Example 2 – 100 % silica	Comparative Compositions			Inventive Compositions	
	SIL10	SIL15	SIL22	SIL06	SIL04
S-SBR Buna VSL 5025 HM-1	80	80	80	80	80
BR Europrene Neocis	33	33	33	33	33
NR	10	10	10	10	10
Zeosil 1165 MP	70	70	70	70	70
TESPT (X50S)	11,20	11,20	11,20	11,20	11,20
aromatic oil	5	5	5	5	5
wax	1	1	1	1	1
stearic acid	2	2	2	2	2
ZnO	2,21	3,34	4,93	1,32	0,88
6PPD	2,5	2,5	2,5	2,5	2,5
MBTS 80	3,75	3,75	3,75	3,75	3,75
sulfur	1	1	1	1	1
amount of ZnO, expressed as equivalents of zinc oxide, based on the total weight of the tread (%)	1,00	1,50	2,20	0,60	0,40

TABLE IC

Example 8 - 100 % CB	Comparative Compositions			Inventive Compositions	
	CB10	CB15	CB22	CB06	CB04
SBR 1500	27	27	27	27	27
SBR 1712	73	73	73	73	73
CB (N375)	60	60	60	60	60
aromatic oil	7,5	7,5	7,5	7,5	7,5
stearic acid	2	2	2	2	2
wax	1,5	1,5	1,5	1,5	1,5
ZnO	1,78	2,69	3,97	1,06	0,71
6PPD	1,5	1,5	1,5	1,5	1,5
TBBS 80	3	3	3	3	3
sulfur	1	1	1	1	1
amount of ZnO, expressed as equivalents of zinc oxide, based on the total weight of the tread (%)	1,00	1,50	2,20	0,60	0,40

TABLE II

	105002410 MMX22	105002400 MMX15	105002390 MMX10	105002420 MMX06	105002430 MMX04	105002460 SIL22	105002450 SIL15	105002440 SIL10	105002480 SIL06	105002510 SIL04	CB22	CB15	CB10	CB06	CB04	
Tg0 [min] TS2 [min]																
170°C	5,2	5,2	5,4	4,5	4,0	7,6	7,4	7,2	7,1	5,8	5,5	5,3	5,0	4,3	3,9	
170°C	2,2	2,1	2,1	2,0	1,9	1,8	1,8	1,7	1,7	2,8	2,8	2,7	2,6	2,4	2,3	
CA 1 [MPa] CA 3 [MPa]																
IRHD IRHD	2,6 11,2	2,4 10,9	2,6 11,5	2,7 11,7	2,5 11,5	2,0 8,4	2,0 8,6	2,2 9,0	2,2 8,9	2,4 9,8	2,4 11,8	2,4 12,5	2,0 10,0	2,0 10,4	1,8 9,5	
23°C 100°C	68 62	68 62	68 63	70 63	69 63	68 62	68 64	69 64	69 57	70 58	69 54	70 54	69 54	68 52	65 52	
R.E. [%]	43	42	42	39	40	43	44	41	44	45	31	31	32	32	31	
ABRADED VOLUME [mm <sup>3</sup> ]																
10 Hz																
E' [MPa]	10,5 4,6 0,435	10,6 4,6 0,441	10,2 4,5 0,444	10,8 4,6 0,430	11,7 5,1 0,463	10,9 5,1 0,463	10,9 5,2 0,463	11,2 5,2 0,460	10,6 4,7 0,448	16,2 7,8 0,481	15,9 7,6 0,480	15,5 7,4 0,481	15,7 7,7 0,489	14,6 7,4 0,509		
E'' [MPa]																
TAN DELTA																
E' [MPa]	5,3 0,7 0,128	5,3 0,7 0,132	5,1 0,7 0,144	5,5 0,7 0,122	5,7 0,8 0,136	5,3 0,7 0,132	5,2 0,7 0,139	5,4 0,7 0,130	5,5 0,6 0,108	5,3 1,3 0,224	5,6 1,2 0,219	5,6 1,2 0,233	5,2 1,3 0,236	5,3 1,2 0,236	4,9 1,2 0,236	
E'' [MPa]																
TAN DELTA																